DONGWEI CHEN, PH.D.

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EMPLOYMENT

Colorado State University   August 2024 - Now
Postdoctoral Fellow in Mathematics   *Fort Collins, CO*

EDUCATION

Clemson University   August 2019 - August 2024
Ph.D. in mathematics   *Clemson, SC*

Institute of Atmospheric Physics, Chinese Academy of Sciences   September 2015 - July 2018
M.S. in atmospheric science   *Beijing, China*

Fuzhou University   September 2011 - July 2015
B.S. in mathematics   *Fujian, China*

RESEARCH INTERESTS

1. Optimal transport and its applications in data science.

2. Harmonic analysis: probabilistic frame, frame theory, and reproducing kernel Hilbert space(RKHS).

3. Turbulence, renewable energy and climate science: intermittency in turbulence, ramp-cliff events in wind power, solar and wind power prediction, and climate stability analysis.

PUBLICATIONS

Frames and Reproducing Kernel Hilbert Spaces

1. **Dongwei Chen**, Emily J. King, and Clayton Shonkwiler. Redundancy of Probabilistic Frames and Approximately Probabilistic Dual Frames. (In Final Preparation)

2. **Dongwei Chen***. Probabilistic Dual Frames and Minimization of Dual Frame Potentials. `arXiv: 2502.17760` (submitted o JFAA, under review)

3. **Dongwei Chen** and Martin Schmoll. Probabilistic Frames and Wasserstein Distances. `arXiv: 2501.02602`

4. **Dongwei Chen***. Paley-Wiener Theorem for Probabilistic Frames. `arXiv:2310.17830`(submitted to JMAA, under review)

5. **Dongwei Chen***; Kai-Hsiang Wang. On the Probabilistic Approximation in Reproducing Kernel Hilbert Spaces. `arXiv:2409.11679`(submitted to CAOT, under review)

Optimal Transport and Machine Learning

6. Zhiang, Xie, **Dongwei Chen***, and Puxi Li. Discovering climate change during the early 21st century via Wasserstein stability analysis. *Advances in Atmospheric Sciences*, 42(2), 373-381, 2025. (This work is reported by AAAS's EurekAlert on January 7th 2025 with title "Unveiling hidden climate dynamics: Researchers use mathematics of optimal transport to decode 21st-century climate change"; Journal impact factor: 6.5; I am the only mathematician among authors;)

7. Qun Tian, Jinxiao Li, Zhiang Xie, Puxi Li, Ya Wang, **Dongwei Chen**, Yue Zheng. A novel metric for quantifying solar irradiance stability: Mapping solar irradiance variability to photovoltaic power generation. *Renewable Energy* 239, 122035, 2025. (Journal impact factor: 9; I am the only mathematician among authors)

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*Corresponding Author

8. **Dongwei Chen**; Fei Hu; Guokui Nian; Tiantian Yang. Deep Residual Learning for Nonlinear Regression. *Entropy.* 2020, 22, 193. (*110 citations*)

9. Jiang, Chao; Canchen Jiang; **Dongwei Chen***; Fei Hu. Densely connected neural networks for nonlinear regression. *Entropy.* 2022, 24(7), 876. (*26 citations*)

Turbulence

10. Tiantian Yang and **Dongwei Chen***. Beta-generalized Lindley Distribution: A Novel Probability Model for Wind Speed. `arXiv:2503.09912`(submitted to Renewable Energy, under review)

11. **Dongwei Chen**; Fei Hu; Jingjing Xu; Lei Liu. Long-range correlation analysis among non-stationary passive scalar series in the turbulent boundary layer. *Physica A: Statistical Mechanics and its Applications.* 2019, 517, 290-296.

12. **Dongwei Chen**; Fei Hu; Jingjing Xu. On the scaling law of ramp structures in scalar turbulence. *Atmospheric and Oceanic Science Letters.* 2018, 11(4), 372-377.

OPEN SOURCE CODE

1. ResNet Rgression: `https://github.com/DowellChan/ResNetRegression`.

2. DenseNet Regression: `https://github.com/DowellChan/DenseNetRegression`.

3. Wasserstein Stability Analysis: `https://doi.org/10.5281/zenodo.7839648`.

4. BGL distribution for wind speed: `https://github.com/tiantiy/BGL-for-Wind`

INDEPENDENT TEACHING

1. Linear Algebra for Data Science, DSCI 369, Section 1 and 2, 2025 Spring, Colorado State.

   –This class introduces linear algebra from the data science perspective with python coding.

2. Introduction to Ordinary Differential Equation, Math 340, Section 3, 2024 Fall, Colorado State.
   –This class introduces ODE for engineering students.

3. Business Calculus II and Lab, MATH 2070 and Math 2071, Clemson.

   –Section 004 with 30 students, 2023 Fall. The averages of all three tests were ranked No.1 among 12 sections. The course evaluation was 4.26 out of 5.

   –Section 014, 2024 Spring. The course evaluation was 3.98 out of 5.

4. Business Calculus I and Lab, Math 1020 and Math 1021, Clemson.

   –Section 010 with 30 students, 2022 Fall. The course evaluation was 4.18 out of 5.

   –Section 013 with 40 students, 2023 Spring. The averages for the 1st and 2nd test were ranked No.1 among 17 sections, and the 3rd was ranked No. 2. The course evaluation was 4.32 out of 5.

INVITED PRESENTATION

1. *Discovering Climate Change via Optimal Transport.*
   –The IDA Seminar, Department of Mathematics, Colorado State University, December 5th, 2024;
   –Special Session on Recent Advances in Physics Inspired Machine Learning, SIAM Conference Texas-Louisiana Section 7th Annual Meeting, Baylor University, Tx, October 12th, 2024.

2. *On the Probabilistic Approximation in Reproducing Kernel Hilbert Spaces*, ACM/SIAM Seminar, University of South Carolina, SC, October 4th, 2024.

3. *Probabilistic Frames and Concepts from Optimal Transport.*
   –Special Session on Recent Advances in Optimal Transport and Applications, 2024 AMS Spring Eastern Sectional Meeting, Howard University, Washington, DC, April 5-7, 2024;
   –Computational Analysis Seminar, Vanderbilt University, Nashville, TN, April 3, 2024.

4. *Optimal Transport and Its Application in Machine Learning.* Graduate Student Seminar. Clemson University, SC, Sep. 7, 2023.

5. *A land of c-monotonicity in optimal transport.* Shing-Tung Yau Center of Southeastern University, Nanjing, China, Dec.09, 2022. (Virtual)

6. *Neural network regression, uncertainty quantification and their applications in climate and turbulence modeling.* School of Earth, Atmosphere and Environment, Monash University, Victoria, Australia, Mar.22, 2022.(Virtual)

PROFESSIONAL SERVICE

1. Journal Review: Circuits, Systems & Signal Processing

2. Lead Meeting Organizer: Special Session on *Recent Progress in Frame Theory and Harmonic Analysis.* 2025 AMS Fall Western Sectional Meeting, Denver, CO. August 23–24, 2025.